

## ABSTRACT OF THE INVENTION

With keeping an atmosphere including oxygen within a chamber and with a wafer kept at a low temperature, plasma generated within the chamber is biased toward the wafer, and the wafer is subjected to the plasma. A semiconductor layer exposed on the wafer is oxidized into an oxide film. Thus, an oxide film can be formed even at room temperature differently from thermal oxidation. This oxidation is applicable to recovery of an implantation protection insulating film having been etched in cleaning a photoresist film, relaxation of a step formed between polysilicon films, relaxation of a step formed within a trench and the like. Also, before removing a photoresist film used for forming a gate electrode including a metal, a contamination protection film can be formed by this oxidation with the photoresist film kept.

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